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OFFICIAL MINUTES OF THE MEETING OF THE ENTOMOLOGICAL CLUB OF THE A. A. A. S., 1891.

(Continued from page 222.)

AUGUST 20, 1891.

The Club met pursuant to adjournment at 9 a. m., President Osborn in the chair. Eighteen members present. The minutes of the first day's meetings were read, amended and approved.

Mr. Lintner spoke on

THE PEAR MIDGE, *(Diplosis pyrivora)* IN NEW YORK.

It had been brought to his attention as an injurious species during the present year. It has been abundant at Catskill, and in small numbers has extended to within 20 miles of Albany. After careful search he has found a single infested pear at the latter city. He gave a history of the investigations made in this country on the species, and detailed all that was known concerning its life history. The character of the injury done was carefully described and specimens were exhibited. He also gave a history of the experiments made to control the species, and spoke approvingly of a suggestion that some application to completely blight and destroy the blossoms of infested orchards, more particularly the Lawrence trees, be made to exterminate the pest. It is so numerous, 15 to 35 larvæ in a single pear, and 90 % of the entire fruit infested, that he ranks it among the most injurious, and with the pear *psylla* the most serious obstacle to pear growing in New York.

The larvæ mature about the first of June. They then emerge from the pears, usually during or after a rain, drop to the ground and bury themselves a short distance. In 10 days they make a cocoon covered with grains of sand; but how long they remain before pupating he could not say. He asked whether Mr. Smith's statements concerning methods of oviposition made before the Association of Economic Entomologists

was based on personal observation. It was at variance with the descriptions of this operation and somewhat surprising.

Mr. Smith replied that he had never watched oviposition, nor had it been watched in this country so far as he was aware. His statements were inferences based on examinations of infested fruit. The passage from the ovaries to the outside of the pear was large and open, so no necessity existed for a puncturing of fruit by either insect or larva. He further found that in a lot of infested pears placed on moist earth, most of the larvæ left the pear by this same aperture.

Mr. Lintner expressed surprise at this, and described his experience, which was that the fruit usually cracks transversely near its base, and that the larvæ make their way to the surface through these cracks.

Mr. Southwick asked as to the best way to breed Cecidomyidæ. He had been very unsuccessful with some species he had attempted to rear.

Mr. Smith thought no general rule could be laid down, as the habits of the insects differ so much. Our effort must be to keep them in natural conditions as much as possible.

Mr. Lintner agreed to this and added, that there was much difference in the ease with which species could be bred. With some, success was very difficult.

Mr. Fletcher found them easy to rear as a rule, if they were given the constant care and attention necessary. He thought the blighting of the blossoms might be done without injury to the tree, as the blossoms of many varieties expanded before the leaves appeared, and even if some leaves were destroyed at this season the injury would soon be repaired.

Mr. Lintner asked what material could best be employed?

Mr. Fletcher suggested the arsenites, and preferably London purple on account of its causticity.

Mr. Howard asked whether Mr. Fletcher had considered what effect this would have on the bees.

Mr. Fletcher said he had not. It was an off-hand suggestion; but sulphate of copper might be substituted, and would not, he thought, hurt bees. He was, however, rather sceptical as to the injuries to bees from spraying flowers, and intended next spring to experiment on this question,

Mr. Osborn asked whether the midge was confined to pear or was known to attack other fruits? He explained that he had found a Cecid-

omyid larva on choke-cherry, with habits very like those described, and thought it might possibly be the same.

Mr. Fletcher thought it unlikely that a pear insect would be found on *Prunus*. It might possibly be found in some allied forms like Cratægus. as is *Anthonomus 4-gibbus* at Ottawa.

Mr. Howard gave some notes on

THE ENCYRTINÆ WITH BRANCHED ANTENNÆ.

He gave a history of the gradual discovery of these aberrant forms, a box of which he exhibited, and explained by means of blackboard figures the nature of the curious antennal modifications. Excellent drawings of the species were also exhibited.

In response to a question from Mr. Osborn, he stated that one of the species was bred from *Bucculatrix;* but that the hosts of the others were not known.

On motion of Mr. Kellicott, the President appointed Messrs. Kellicott, Smith and Howard, a committee to nominate the officers of the club for next year.

The Club then adjourned until 1 p. m.

AFTERNOON MEETING.

The Club reassembled at 1 p. m., with President Osborn in the chair and twenty-seven persons present.

A paper by Mr. Hubbard being called for,

Mr. Schwarz stated that the communication to be presently read by the Secretary was not an elaborate paper, but a private letter hastily written by the author while still in the field. The insects mentioned therein had, of course, not yet been studied, and could only be determined by Mr. Hubbard after his return. But on account of the highly interesting information it contained, the letter was eminently fitted to be laid before the Club. No previous observations on the insect life in the Hot Springs of the Yellowstone Park seem to have been made, although this interesting locality had frequently been visited by scientific parties. In fact, beyond Dr. Packard's short article in the American Naturalist on a *Stratiomys* larva from a hot spring in Colorado, he was not aware that anything had been published in North America on the insect fauna of Hot Springs. Further, there was very little recorded of the general insect fauna of the Yellowstone Park, and he even remembered having seen

somewhere a statement in print to the effect that the Park is remarkably poor in insect life. It would appear from Mr. Hubbard's letter that this notion had to be considerably modified, at least so far as the Coleoptera are concerned.

The Secretary then read the following paper :—

INSECT LIFE IN THE HOT SPRINGS OF THE YELLOWSTONE NATIONAL PARK.

BY H. G. HUBBARD.

Pleasant Valley Hotel, August 7, 1891.

"The arrangements we had to make with the proprietors of the stage line gave us a trip of five days from Beaver Canon to the mammoth Hot Springs for $35 apiece, there being three of us. But if we stopped over anywhere it was $10 extra; it was also $10 extra to make the trip to Yellowstone Lake. But I am very glad we did not omit this, as it is by far the most delightful part of the Park. As the distances in the Park are tremendous, you can imagine I had not much time for collecting, and most of the insects I did get were taken when I could get out and walk while the carriage was going up some long hill. However, we had an entire day at the middle and upper geyser basins, as we had to travel only eight miles. There were hundreds of pools and geysers to visit which would have more than occupied the entire day if I had not skipped most of them. I, however, saw three of the large geysers play, and that was quite sufficient. These geysers and hot springs always build up either a hill, or if there are many of them together, they form, perhaps, immense terraces, covered with pools full of boiling water, and generally running over in thin streams. Millions of insects fall into these transparent pools, or get suffocated by the steam, and their dead bodies are floated to the edge of the basin, and there, in a few hours, they are coated with lime. Around all the pools and geysers and everywhere in the Park, where hot sulphurous water is running over the ground and forming tepid or hot pools, there is to be found *Cicindela hæmorrhagica*. At the mammoth hot springs on the terraces, where the hot water forms shallow basins, I saw this *Cicindela* running along the edge of the flutings, where the water, quite warm, was pouring over the rim. They did not hesitate to run in the water where it was one-eighth of an inch deep. I thought they must be there for some predatory purpose, so I examined these basins carefully, and, sure enough, there were thousands of minute gnats

emerging from the pupæ, which floated up against the edges of the basins and pools. The larva was also abundant in the geyserite precipitate that forms a flocculent mud in all these tepid basins. I soon found that this mud is alive with insects, chiefly Diptera, but there is a very large and white *Ochthebius* and its larva, and also a common *Philhydrus*. The latter lives only in the tepid pools, while the *Ochthebius* inhabits water that is very much warmer. I regret that I had not a thermometer with me to test the temperature. There is, of course, a little *Salda* running about the edges, and this seems to stand any amount of heat, as I find it about the edges of springs which are actually boiling. But the most curious thing of all is the presence of two species of *Nebria*—one of large size, with yellow legs; the other smaller, and entirely black, living under pieces of geyserite about the hot springs, and even on the sides of the cones of the largest spouting geysers, where they are liable to be washed away in a flood of boiling water. The larvæ of these *Nebrias* live also in the sulphurous geyserite sand near the hot springs and geysers, but not so near to the geyser vents as the imagos. There is, however, a large *Bembidium*, with variegated elytra, which is always found under bits of geyserite and in the geyserite sand about every hot spring and geyser; its larva lives with it in the same places.

In the Firehole River, just below the Excelsior geyser, which continuously pours rivers of boiling water into the stream and raises its temperature to probably 70° or 75° F., there lives an *Elmis* of medium size; but I found it rare and had not time to collect it in any numbers. In a small stream of tepid water, running through a grassy plain, I found that same slender, undescribed *Elmis* which we took below the old powder mill in Ogden Canon. It swarmed in this stream in countless millions, every stone and stick was alive with it and its larva. There was also a *Corixa*, apparently the same species I took in Utah Lake. Here it swarms in incredible numbers, forming black masses all along the sides of the stream. Of course the stream was sulphurous and heavily charged with mineral matter, so that sticks, moss and everything that fell into the water was soon silicified or coated. All the stones and sticks in the bottom were streaming with peculiar algæ of various colours. In the Firehole River, above the upper geysers, where it is an ordinary mountain stream and quite cool, I found in debris in the water a marvellous *Elmis* with red spots; but four times larger than the largest I ever saw. In the same debris were peculiar aquatic larvæ, apparently Coleopterous, and

belonging to different families, but I did not get the imagos.

I found here, at the upper geyser basin, a few things on the spruce trees, but nothing new. There are one or two *Telephorus*, *Corymbites*, several *Dascyllidæ*, etc. *Malachiidæ* of the genera *Dasytes* and *Listrus* are also common here as elsewhere on spruce and pine. Nowhere else in Yellowstone Park have I been able to find anything on pines except these Malachiids. Beating trees and bushes seems to produce nothing at all. At the upper geyser basin there was a large meadow, which had over part of it a deposit of alkaline mud, dry and cracked in the sun. Here I find a gigantic *Aphodius* with variegated elytra *(A. hamatus ?)* under cow-dung. Only one specimen was alive, the others had been killed by the hot sun, and their dead bodies were very abundant on the mud or under dry dung. An *Elaphrus*, apparently *E. ruscarius*, was running about on the mud in the hot sun. In patches of cyperaceous grass in this alkaline plain I got a large Patrobus-like Carabid, or else a peculiar *Pterostichus*. There was also a *Stenus* under the dead grass.

On July 27th, at evening, we arrived at Yellowstone Lake. The shore of the lake, which I was not long in visiting, consists either of glacial boulders, or beaches of rather coarse, black gravel. No insects are thrown up by the waves at present, except, perhaps, an occasional Hemipter or *Coccinella*. However, there is a beach fauna, consisting of the usual black *Cryptohypnus* of large size *(C. funebris)*, a large black *Anthicus*, which is very common, and a much rarer species quite minute in size. To my great surprise I found here a single specimen of that same peculiar Coleopterous larva (*Saprinus ?*) with maggot-like body and almost obsolete legs, that I found among the Ephydras on the shore of great Salt Lake. There were also a few species of dark bronze or black *Bembidium* and an *Amara*.

On July 29th we were on the road from the Grand Canon to the Mammoth Hot Springs, which we reached late in the afternoon. I visited the nearest group of hot springs and found the usual fauna. The neighbourhood is cavernous, and a river of hot water runs beneath the hotel. Under stones there are crickets, which evidently belong to a subterranean species. We spent the next day at the mammoth hot spring, and I had a good chance to collect. I found the *Ochthebius* and other things in the hot water on the terraces, and under stones a good many *Amara*, *Pterostichus*, *Patrobus*, etc. A cedar appears here for the first time, and is growing on the terraces formed by the hot springs. On this I found, by beating, a

beautiful mottled *Anthicus* ; not at all rare, and a few other things, Malachiidæ and Curculionidæ, etc.; among them a beautiful Otiorhynchid, with cream-coloured elytra, showing metallic copper-red colours beneath. On cedars below the hotel there was a *Helops*, some *Cistelidæ*, *Elateridæ*, and one specimen of a very large Longicorn of a genus allied to *Anthophylax*. Under loose stones on the dry hillsides I found good Carabidæ, *Harpalus*, *Amara*, *Pterostichus*, and a *Cymindis*, quite common. Continuing down the mountain side about 1,000 feet I finally reached the Gardiner River, which is a cool, rapid, mountain stream, bordered with tall willows, larch, birch, aspen, wild rose, cherry, etc. Here I find covered beaches with an abundance of *Nebrias* of several species. A large one, with yellow legs, may be the species found about the geysers. The black species are either very variable, or there are several species among them. I think the smallest, which has a tendency in some localities to become brown in colour, is not a *Nebria*, but belongs, perhaps, to *Pelophila*. There is also a very elongate black form which resembles a *Patrobus*, but is of very large size. Here I found a very neat *Elmis*, quite different from those known to me. It is moderately large, uniform dark-bronze in colour, and of very short, thick, form. It lives very differently from any *Elmis* I ever saw. It is *under* small stones close to the shore, and can only be found by disturbing the gravel with the hand, whereupon the beetles are upset and float about in the water, and seize upon the rootlets of willows that grow among the stones. This same Elmid I have found since in a little trickling stream which came down the steep bank of the Yellowstone River near this place. This little stream was as cold as ice, and densely shaded with nettles and a very tall umbelliferous plant. The Gardiner River was the first stream I had found that is a natural mountain torrent. All the streams in the western part of the Park are vexed with devils of one sort or another in the shape of hot water, sulphur and steam, and are full of queer, slimy algæ, deposits of lime, etc. The Yellowstone River which flows near me here is also partly sulphur water, but still it is full of trout, and its shores produce all the species of *Nebria*, *Pelophila* and *Patrobus* that I have mentioned. I find also in shady places, where moss grows under willows by the borders of the streams and in debris, a few *Bledius* and *Micrædus*, with one or two other *Omalini*. Deep in a pile of debris on the shore of the Yellowstone River near here I found also *Dianous*.

On July 31st we took a carriage from Mammoth Hot Springs and

came to this place. The distance is 18 miles, and the road ascends a high mountain chain and then descends into this valley, which is close to the junction of the East Fork with the Yellowstone, and is 15 or 20 miles below the Grand Canon. We are here in a most beautiful country of great diversity, and almost never visited by tourists. There are dense forests of spruce and fir, some of the latter reaching a good size; there are also parks and meadows, lots of streams, from the great Yellowstone River to the smallest brooklet. Rocks, grass-covered hills, wild flowers, desert plants, abound in infinite variety, and there are also warm springs near at hand. We are all of us very much pleased, and I have good collecting, while the freshest and most bracing mountain air invigorates all of us."

In commenting on this paper, Mr. Schwarz remarked that the glistening surface of large bodies of water was known to attract many insects, but that in the case of the hot springs of the Yellowstone Park, which are of small extent, we must in all probability seek for another cause to account for the multitude of insects that fall into the hot water. It appeared quite probable that the gaseous exhalations of these springs and geysers would prove to be the attractive cause, and he recalled the fact that at the solfataras of European volcanoes large numbers of suffocated insects had been observed, the presence of which could hardly be due to accident. Similar observations had also been made at the solfataras near Santa Barbara, Cala. Among the Coleoptera, found by Mr. Hubbard in or near the hot springs, the *Nebrias* are of especial interest, because we had hitherto been accustomed to associate the occurrence of these Carabids with cold streams and snowfields in alpine regions.

Mr. Lintner expressed his appreciation of the character of the paper, and complimented Messrs. Hubbard and Schwarz on the excellent service done by them in working up the fauna of special regions.

Mr. Lintner spoke on

THE PEAR PSYLLA (*P. pyricola*) IN THE HUDSON RIVER VALLEY.

He gave a review of the history of the species, described the methods of injury and discussed the possible remedies. He finds unexpected success in using the kerosene emulsion even against the mature insects. He briefly discussed the life history, finding that there were two broods at least. The eggs and method of oviposition were described, particular attention being called to a filament or pedicel-like prolongation of the tip.

Very severe injury had been done during the present year by the insect in the pear orchards of the Hudson River Valley.

Mr. Schwarz said that four species had been confused as *Psylla pyri* by various European authors; that Dr. Franz Loew had, in the Verh. z. b. Ges. Wien, written exhaustively on the subject, and that Schmidberger's *pyri* is identical with *pyrisuga*, Foerster, which does not occur in North America. He had observed *pyricola* in Michigan, where it is not common and where, late in the fall, it assumed that intense coloration which indicates hibernation in the imago state.

Mr. Lintner spoke further

ON THE EYE-SPOTTED BUD-MOTH (*Tmetocera ocellana*) IN WESTERN NEW YORK.

This insect had been very destructive in the orchards of the western part of the State—many of the orchardists representing it as having caused them more harm in their apple orchards than all other insect pests combined. The caterpillar fed upon the unopened buds, on the blossoms, on the young leaves as they first put forth, webbing them together, on the advanced foliage, and it was also reported as boring into the young twigs. Its habit of concealment, after its operations disclosed its presence, made it almost impossible to reach by the usual application of the arsenites. From the severe injury that it was occasioning, it was very desirable that some method of destroying it should be discovered and recommended to our fruit growers. He had believed that eggs were deposited in the month of April by the parent moths, from some imperfect and denuded specimens that had been captured fluttering about the fruit trees at this time, and which seemed to be that species; but Prof. Fernald and others had stated that the insect hibernated as a half-grown larva under a silken tent spun upon the fallen leaves. Some of the larvæ which Mr. Lintner had hatched from the eggs in June, had attained such size in early July when they died, that they should certainly have attained full maturity during the early autumn. He also exhibited specimens of the very remarkable, extremely flattened and disc-like egg, which he thought could not be the same with that which Prof. Fernald had described in Bulletin No. 12 of the Hatch Experiment Station for April, 1891. If the egg is deposited in the early spring, it could be killed by a kerosene emulsion; if the larvæ hibernate in the fallen leaves, they could be kept from ascending the tree, or destroyed by collecting and burning the leaves.

Mr. Fletcher had found larvæ on apple twigs in winter in Nova Scotia, hibernating beneath a silken covering, which he thought were undoubtedly this species. He had also secured eggs during the past summer at Ottawa, where it had been one of the notable pests of the season.

Mr. Lintner also made remarks

ON SOME OF OUR ORGYIAS.

Some time since Mr. Smith named some specimens of *Orgyia* in his collection as *O. definita*, stating that there were no *leucostigma* in the Albany collections to his knowledge. More recently Mr. Dyar had seen the specimens, and had pronounced them all *leucostigma*. He also pointed out that the egg mass of *leucostigma* is covered by the female with a frothy mass. That of *definita* is almost bare, having only a slight covering of hairs, and there is no frothy substance whatever. He had reared from eggs received from Mr. Dyar a specimen of *definita*, which certainly seemed distinct from what he had in his collection. He had also bred *O. nova*, which deposited its eggs in a single layer upon the surface of the cocoon, without any covering whatever.

He had been especially interested in this latter species because of its supposed resemblance to the European *antiqua*, and would endeavour to get the early stages of both for comparison.

Mr. Smith said that the late Mr. Hy. Edwards had made such comparisons, and had frequently stated positively that they were identical. Concerning his determination of *definita*, he had just been working over the Meske material in the museum collection, which contained only what he took to be *definita*. Mr. Lintner's specimens were seen soon after, and were so well marked and clean that he deemed them the same, and said so. Since then he had seen the egg masses on trees at Albany, and finds them *leucostigma*. He had long known of the difference between the egg masses. Mr. Lintner had very few specimens; and he can only believe that the finest and most sharply marked specimens were retained, and these looked quite different from the normal, obscure and shabby specimens taken.

Mr. Lintner assented, that only the finer specimens had been retained.

Mr. Riley said that he had carefully compared *nova* and *antiqua* in all stages and found them identical.

Adjourned until the 21st inst. at 9 a. m.

AUGUST 21, 1891.

The Club met at 9 a. m., President Osborn in the chair, 27 persons present. The minutes of the second day's meetings were read and approved.

Mr. Mann stated that some enquiry had been made concerning the old minutes of the Club, of which all trace seemed to have been lost. He heard the remark, and remembered that they were in his possession. He gave a history of the Club since its organization in 1874, of its formation as a subsection of the A. A. A. S., which was not a success, and of the reorganization at the Minneapolis meeting, since which time it has flourished. He now turned over to the Secretary the book and its contents.

Mr. Kellicott moved that the Secretary be empowered to complete the minutes from published records, so far as they were obtainable and had not been already incorporated in the book. Carried.

The Nominating Committee reported, recommending for election :—

President, E. A. Schwarz, of Washington, D. C.

Vice-President, E. A. Popenoe, of Manhatten, Kansas.

Secretary, C. L. Marlatt, of Washington, D. C.

On motion the report of the Committee was unanimously approved, and the above gentlemen were elected accordingly.

Mr. Mann, from the committee to consider the recommendations of the President's address, presented the following report :—

To the Entomological Club of the A. A. A. S.:

Your committee, appointed to consider the recommendations contained in the annual address of the President, has attended to its duty, and begs leave to report.

In regard to an international meeting of entomologists, to be held in 1893, your committee deems the suggestion an excellent one. It is of the opinion that such a meeting should be held in connection with the meeting of the A. A. A. S. in that year, and that all entomologists should be invited thereto. It is expected that the Association of Economic Entomologists will invite and secure the attendance of home and foreign economic entomologists at its meetings, and it is recommended that the same excellent arrangement for co-operation be made in the future as was made for the meetings of this year, by which all members of the Associ

ation or the Club who have papers to read on economic entomology should be invited to read them at the meetings of the Association, and all who have papers on technical entomology or life habits be invited to read them to the Club. It is recommended that a committee be appointed to confer with the officers of the Association of Economic Entomologists to make the above suggested arrangements, if practicable, and to prepare and send out invitations, preferably in the form of a joint address from the two bodies.

In regard to the preparation of a Manual of Entomology, your committee deems it a matter of high importance that such a manual be prepared, and sees no insuperable obstacle thereto. It is of the opinion that this should be a technical work, for entomologists, rather than one calculated to interest and allure the non-entomologist. Such a work as that of Westwood's Classification, adapted more especially to the present status of entomology in this country, would be of inestimable value. In the opinion of the committee it should carry the classification to the point of the determination of genera by systematic tables, not undertaking further to describe or define the genera.

The committee recommends that the preparation of such a work be committed to several hands, and that the primary distribution of its subject matter be as follows, as nearly as practicable :—

Introduction and System—Dr. A. S. Packard.
Metamorphoses and Life-habits—Dr. C. V. Riley.
Hymenoptera—Messrs. E. T. Cresson and L. O. Howard.
Lepidoptera—Dr. J. B. Smith.
Diptera—Dr. S. W. Williston.
Coleoptera—Dr. G. H. Horn.
Hemiptera—Prof. H. Osborn.
Orthoptera—Prof. L. Bruner.
Neuroptera—Mr. Ph. Calvert.
Myriapoda—Mr. N. Banks.
Archnida (sens. lat.)—Dr. Geo. Marx.

It is expected that in the larger or more difficult groups the editors named would be at liberty to subdivide their work, and to call in such assistance as they might desire.

Respectfully submitted.

B. PICKMAN MANN.
J. B. SMITH.
JAMES FLETCHER.

On motion the report was received, and Mr. Mann moved its adoption.

Mr. Riley objected on business considerations, and detailed at some length the obstacles in the way of preparing and publishing a manual like that suggested. No definite plan had been presented, and the adoption of the report and an attempt made to carry it out might involve the Club in great difficulties.

Mr. Smith from the committee explained that all these difficulties had been realized by them, and hence, while their report was favourable, they had intentionally omitted any definite suggestions of a business character, realizing that this required much more time than they had, for consideration.

Mr. Osborn explained his views on the subject, and urged the necessity of a manual.

Mr. Mann thought such a manual must be prepared eventually, and that, with the backing of the Club, and with an array of names such as that proposed, no difficulty should be found in getting a publisher.

Mr. Riley suggested that the report be divided, and moved that the first recommendation of the committee, concerning an international meeting, be adopted. Carried.

Mr. Howard moved that the balance of the report be recommitted to the same committee, with instructions to report a well digested scheme one year hence.

Mr. Mann moved that a committee of three be appointed by the President under the first recommendation on an international meeting.

This was carried, and the President reserved the selection of the committee.

The President afterwards named Messrs. Kellicott, Howard and Fletcher.

At the request of Mr. Fletcher the official minutes of the Club were ordered to be printed in the CANADIAN ENTOMOLOGIST.

The following was then presented by the author :—

PRELIMINARY REMARKS ON THE INSECT FAUNA OF THE GREAT SALT LAKE, UTAH.

BY E. A. SCHWARZ, WASHINGTON, D. C.

The Great Salt Lake of Utah has been easily accessible for many years, and its shores have been visited by various entomologists ; so that

it seems strange that no one has hitherto published a comprehensive or even partial list of the insects occurring in that interesting locality. During the present summer, while on a short excursion to Utah with Mr. H. G. Hubbard, we had the opportunity of spending some time in the investigation of the insect fauna of the Lake. The larger portion of the insects collected by us, however, are not yet mounted, and still less determined, and the following remarks on our observations, which I venture to offer, are necessarily quite fragmentary and of a preliminary character.

The insect that, on account of the enormous number of individuals, cannot fail to attract the first attention of every visitor to the Lake, is a Dipteron of the genus *Ephydra*. Various species of this genus are known to occur in great number in salt water, and others occasionally become a nuisance in the vats and conduit pipes of salt-works. The particular species from the Great Salt Lake was first collected by Capt. Stansbury's expedition, and briefly noticed in 1852 by T. R. Peale in a letter appended to Prof. Haldeman's paper on the few insects collected by that expedition. Subsequently Dr. Packard (Am. Journ. Sc. and Arts, 1871, p. 105,) described the puparium and named the species *Ephydra gracilis*. The larva and imago still remain undescribed.

Along the sandy beaches of the ocean we usually find one or several windrows of seaweed cast up by the waves and marking the line of high tides. Similar windrows may be seen all around Great Salt Lake, but they consist exclusively* of the puparia of this *Ephydra*. The lake itself is full of floating puparia, which are gradually washed ashore, and if the breeze freshen and the waves get higher, the mass of puparia is pushed higher up the beach and forms a well-defined windrow, which can be plainly distinguished even on small photographs of any part of the lake shore. On June 13th, the most recent windrow (*i. e.* that nearest to the water), averaged nearly three inches in height and from four to five inches in width wherever the beach is sloping; at the rocky portion of the beach it was much higher, while on the flats the puparia are more spread out and form a kind of matting over the wet salt mud. Later in the season the accumulation of puparia became much greater. Investigation of the puparia on the day mentioned showed that most of them were alive, that only a small proportion had hatched, and that there was not a

*The dead bodies of various insects of other orders which have fallen into the Lake are intermingled with the mass of the Ephydras. Most of them are badly decayed, and the number of individuals and species thus found is very small.

single larva among them. On the sloping or rocky part of the beach the puparia rest upon dry ground and become themselves almost entirely dry. Here they remain for several days exposed to the warm sun, and it is certainly remarkable that under these circumstances they retain their vitality. ** From a tin box full of the puparia which I picked up on a dry spot on June 14th, the flies began to hatch by the thousands on June 19th. In the middle of June, the weather being rather cool, the imagos were not very abundant at the lake. They rest on the wet sand or on the rocks, and here, in the little pools between the rocks, we observed that the flies deliberately go under the water to a depth of two or three inches. Whether they do this for the purpose of ovipositing or of feeding on the algæ has not been ascertained. On June 25th the number of flies had already considerably increased, but on July 4th, when the little bathing establishment at Syracuse, on the eastern shore of the lake was visited, the number of flies was really alarming. On this point there are numerous shallow pools close to the lake beach, between the railroad dam and the dykes of the salt works, and the flies completely covered the edges and the surface of the pools, forming an unbroken coal-black mass. No observations on other insects would have been possible under these circumstances; but, fortunately, the flies could be driven away to some extent, and the roar of the rising flies is such as to drown the noise of the railroad trains passing close by.

The question where the larvæ of this *Ephydra* breed has not been fully settled by us. Numerous larvæ were found in the pools between the large stones near the famous Black Rock. They were still more abundant in the little sulphurous streams on the salt flats, thickly clinging to the slimy, thread-like algæ, upon which they probably feed. But all larvæ from these two sources account only for a small fraction of the prodigious number of puparia along the lake. It is evident that the majority of the larvæ must live in the open lake, where numerous reefs in shallow water appear to be favourable breeding places.

Whether the numerous crustacea (genus *Artemia*) that live in the lake feed on the *Ephydra* larvæ, or whether the sea-gulls and other birds so abundant on the salt flats feed on the puparia has not been ascertained; nor did we see any trace of the Chalcid parasite reported to infest the

**During calm weather the puparia must float for several days on the lake, and it would seem probable that the imagos are able to issue from the pupa on the surface of the water.

larva of *Ephydra riparia* in Europe. *Saprinus estriatus* is very abundant under and among the accumulated living puparia, and feeds upon them, while the larvæ of one or two species of *Dermestes*, which are also common at the same place, presumably feed only on the empty pupa shells. Very few other insects, and these only of small size (small Carabidæ, Staphylinidæ and Anthicidæ), are to be found among the puparia; but whether or not these feed upon the latter remains uncertain. A peculiar enemy of the imago fly was observed at Syracuse. Here, in the midst of the pools covered with the Ephydras, a commotion was occacasionally observed as if a fish of considerable size had risen to the surface of the water. Mr. Hubbard succeeded in capturing one of these mysterious creatures, which proved to be the larva of a toad. It appeared that this tadpole comes to the surface of the water right among the Ephydras, with a dexterous motion of its tail sweeps a goodly number of the flies into its wide mouth, and retires again to the bottom of its ill-smelling abode. The toad itself, which was found by Mr. Hubbard deeply imbedded in the mud at the edge of the pools, is terrestrial and evidently nocturnal in its habits, but no doubt feeds also on the Ephydras.

Ephydra gracilis is the only insect that inhabits the open lake; but on the salt flats, where in many places the water of the shallow pools is more or less mixed with fresh or sulphurous water, various aquatic insects and insect larvæ can be found. There are here the larvæ of one or several species of *Tabanus;* a beautiful green Syrphid fly was seen to emerge from the wet mud. There are, further, the larvæ of several dragon flies at least half-a-dozen Dytiscidæ and Hydrophilidæ with their larvæ; and where there is a considerable admixture of fresh water the pools breed numerous mosquitoes and sand flies (*Ceratopogon*).

From what we saw on the beach of the lake and on the salt flats, a specialist in Diptera will find quite a number of interesting halophilous species. But we found it impossible to devote any time to this order, and all I secured was a specimen of a very peculiar slender Asilid, which was swiftly running over the mud, and seems to dislike to make use of its wing.

Next to the *Ephydra* in number of specimens comes the Heteropterous genus *Salda*, which is also well known to inhabit preferably the shores of the ocean and other bodies of saline water. What appears to be *Salda interstitialis* occurs in incredible numbers all over the salt flats

and renders the observation and collecting of other insects very difficult because, unlike the Ephydras, these Saldas cannot be driven away. The imagoes manage in course of time to get out of the way, but the ground remains covered with a multitude of jumping larvæ and pupæ. One or two other species of *Salda* occur among *S. interstitialis* but are much rarer, while the large *S. coriacea* occurred only among the sparse grass growing along the sulphur creeks. A very peculiar species of *Salda* (possibly forming a new genus) was never seen above ground, but lives nearly subaquatic on the underside of stones in sulphur springs or between the wet roots of the grasses growing close to the water. A genus of Heteroptera which we expected to see in great numbers at the lake is *Corixa*, but we were surprised to find only a few specimens of a single species (apparently *C. decolor*, originally described from Clear Lake, Cala.,) in the salt pools near Syracuse. It is possible, however, that they become more abundant later in the season. Various other Heteroptera found at the lake do not appear to be saline species, nor were there any saline Homoptera observed.

No Microlepidopterous larvæ were observed on the saline flora, but there are various species of Microlepidoptera feeding on these plants. None of them were reared; but it is possible that there are among them species peculiar to the Salt Lake reigion. As to the Orthoptera we were surprised at not finding anything that may indicate a saline species.* Some species of Odonata live in the sulphur creeks and some of the imagos were captured; but the same species were also seen at Utah Lake, which is fresh water.

The Coleoptera are best represented among the maritime and saline insects, and since most of our attention was devoted to this order, we found about 100 species in the immediate vicinity of the Lake, not counting those which were found drowned in the water, nor those which plainly belong to the desert fauna, of which quite a number of species

*On June 25th we found at the southern shore of the lake a considerable number of *Anabrus simplex* washed up by the waves and all badly decayed. Since we were unable to find a single living specimen of these gigantic crickets under stones, etc., anywhere near the lake we concluded that they must have bred on Antilope Island, situated about nine miles from the shore where the dead specimens were seen. But since my return from Utah I have read Dr. Aug. Forel's vivid account of the life-habits of the North African desert cricket, *Brachytrypus megacephalus*, which is a nocturnal species and lives on sandy soil in deep holes, which are closed up during day time by a hillet of sand. *Anabrus simplex* has possibly similar habits, and we may, after all, have overlooked its abodes in dry, sandy places close to the lake.

frequent the lake beach. But just as at the ocean, not every species found on the beach is maritime, so at the Great Lake not all species found on saline soil are halophilous. In fact, saline soil seems to possess great attractions to many species, which usually live on the banks of fresh water lakes and streams. This holds especially true of most species of *Bembidium* which abound at the lake. Thus the number of true halophilous Coleoptera inhabiting the shores of Great Salt Lake probably does not exceed twenty-five distributed in the following families :—Cicindelidæ, Carabidæ *(Dyschirius, Pogonus, Bembidium, Tachys)*, Staphylinidæ *(Aleochara, Homalota, Bledius, Thinobius)*, Histeridæ *(Saprinus)*, Chrysomelidæ *(Galeruca, Phyllotreta)*, and Anthicidœ *(Notoxus, Mecynotarsus, Anthicus, Tanarthrus)*. How many of these are peculiar to the Salt Lake* it is difficult to tell at present, where still so little is known of the geographical distribution and mode of occurrence of the smaller and less conspicuous Coleoptera. The species found by us will be fully enumerated in a list of the maritime and saline Coleoptera of North America which I am preparing. Of particular interest is the occurrence of a species of *Pogonus*, since this genus was hitherto known in America only from the ocean shore. Comparing the Salt Lake fauna with our maritime fauna, the most striking difference is the absence in the former fauna of Tenebrionidæ and Rhynchophora** which play such prominent role in our maritime fauna. *Cicindela hirticollis* and *Mecynotarsus candidus* appear to be the only species common to the Great Salt Lake and the Atlantic maritime fauna ; but both are not strictly maritime or saline species. A few other species *(Pogonus planatus, Bembidium ephippigerum*, and the genus *Tanarthrus)* are known to occur also in Southern California, either at the sea shore or at saline lakes, and this distribution seems to confirm the ancient extent of the Great Salt Lake to the extreme southwest of North America.

A number of aquatic beetles live in the sulphur springs and salt ponds contaminated with fresh water ; but, with the possible exception of a *Cœlambus*, they are all species common in fresh water. Phytophagous

*Most of the species found at the Great Salt Lake will no doubt occur also at Lake Sevier, in Southern Utah, which has never to my knowledge been visited by any entomologist.

**Tenebrionids of the genera *Eleodes, Coniontis* and *Blapstinus* are occasionally found at the Lake, but clearly belong to the desert fauna, while certain species of *Sphenophorus*, which abound at the roots of rushes, and a few other Rhynchophora are likewise not saline species.

Coleoptera are not numerous on the saline flora, but most of them occur also elsewhere. The large *Galeruca erosa*, which, when alive, is of a bright sulphur yellow colour, feeds with its larva on a species of *Sueda*, and is clearly a saline species, though not confined to the Salt Lake region.

Concluding this hasty sketch of the Salt Lake fauna, I would say that one of the reasons why so little of this fauna has hitherto been recorded, is that most presons coming from Salt Lake City visit the lake only at Garfield Beach, which is at present the most readily accessible point of the south shore. But just at this spot the saline fauna is but poorly represented, and, moreover, the desert flora and fauna come here close to the lake. The immense salt flats which commence about one mile from Garfield Beach are rarely visited; but here is the home of the genuine salt fauna. Collecting in the semi-fluid and ill-smelling salt mud of these flats is, however, somewhat troublesome, and it would be no easy matter to bring together a complete set of the various species. Fortunately, however, the entomologist finds here assistance in an unexpected way. There are several large salt works on these flats, where numerous large, shallow ponds have been excavated for the purpose of gaining salt by the evaporation process. If there is no water in these ponds, the bottom consists of a tenacious, loam-like mud, saturated with concentrated brine, and here concealed in this mud some of the most characteristic species of the Great Salt Lake fauna *(Pogonus planatus, Dyschirius salivagans, Bledius, (3 species,) Tanarthrus salicola,)* can be found in great numbers of specimens.

Mr. Smith gave some

NOTES ON THE FOOD HABITS OF XYLEBORUS DISPAR.

In the latter part of June while collecting along a road, he noticed that many of the young willows and birches on one side of the road were dead. Investigation showed that in the main stem, usually about three feet from the ground, a colony of Scolytids were boring. At this time there were a few larvæ, more pupæ, but a yet larger number of newly matured beetles. The galleries were longitudinal, and up or down from a main transverse and somewhat irregular central channel, which had an opening through the bark. This gallery so weakened the stems, which were from one-half to one inch in diameter, that they would readily break. In some cases where all the insects were in the imago state all the longitudinal galleries were full of beetles, all headed toward the blind end of

the gallery, the head of one close to the tail of that preceding. The remarkable feature was in the disproportion between the sexes in appearance and numbers. The male was very small as compared with the female, and much more rounded, almost globose. The males, too, were much less numerous than the females; usually there was only one in a gallery, and he was usually at the extreme end. Mr. Schwarz has determined the species as *Xyleborus dispar*. The species has been injurious to pear, but Mr. Smith was not aware that in America it had been recorded from either birch or willow.

Mr. Schwarz was not surprised at this record, because in Europe *X. dispar* eats almost anything, being found in most widely divergent plants. In America it has been reported on pear, apple and liriodendron.

Mr. Fletcher said the species was very injurious to pear and apple in Nova Scotia, but he finds both sexes almost equally abundant, and sometimes entire galleries filled with males only.

Mr. Schwarz said that in this particular group of *Xyleborus* (genus *Anisandrus*, Ferrari), the males are usually much rarer than the females. They are wingless and never leave the burrows, copulation taking place within them. Seven North American species are known to him, but only three in both sexes, and none of the males of our species have ever been described by American authors. He added that *X. obesus*, Lec., would in all probability prove to be identical with *dispar*, the latter being variable in size, according to the nature of its food-plant.

Mr. Smith then gave a note on the

HABITS OF VOLUCELLA FASCIATA.

A lot of prickly pear was received from Ocean County some time in May or June, infested by a Lepidopterous larva which proved to be *Megaphycis bollii* or *Melitera prodenialis*, already referred to by Mr. Riley. The larvæ were counted and the leaves cut so as to make sure of their contents; but at that time nothing was noticed of any other insect. Later the caterpillars pupated, and eventually a moth appeared for every known larva. A few days after a Dipterous pupa was noticed in the jar which had been left undisturbed, and eventually some 8 or 10 Syrphid flies made their appearance. They could not have been parasites for all the Lepidopterous larvæ were accounted for, and I can only suppose that either eggs or very small larvæ were in the partly decaying flesh of the infested leaves and these were overlooked because not expected. Com-

paring the specimens with the typical collection in the U. S. National Museum, they agree in all respects with *Volucella fasciata*, heretofore not recorded north of North Carolina. In his monograph, Dr. Williston in the review of larval habits as far as known, gives *Volucella* as parasitic in the nests of bumble bees. This, therefore, adds not only a new locality, but some positive information on the habits of one of the species of *Volucella*, which is certainly not parasitic and has no connection with bumble bees.

Mr. H. E. Weed made some remarks on

THE NATURAL HABITAT OF THE SCREW-WORM.

The life-history and habits of this insect, *Compsomyia macellaria*, have been given in full in recent bulletins published by the Texas, Louisiana and Mississippi Experiment Stations. A review of the literature is not necessary here, and it suffices to say that it is generally supposed to have its natural habitat in living animals.

It has been well known for some time, however, that the insect also passes through its transformations in dead flesh and decaying vegetable matter. Many observations made this season led him to conclude that the insect's natural habitat is dead flesh, as is the case with many others of the *Muscidæ*.

A visit to any slaughter-house in Mississippi at this season will reveal the larvæ in very large numbers among the refuse matter thrown out. The flies may be seen ovipositing or resting upon weeds or flowers in the immediate vicinity. He has taken them by the thousands in sweeping the weeds and bushes with a net.

At the college, this year, he has collected the flies and knows of no case of screw-worm in that part of the State. If there were cases in live animals he is quite sure they would have been reported. But few cases of screw-worm have been known this season in the southern part of the State, although flies are present in large numbers. It seems probable, therefore, that the occurrence of this insect in living flesh is exceptional rather that the rule.

Mr. Mann had not seen Mr. Weed's report, but had believed that eggs were laid in wounds of animals, not in healthy tissue.

Mr. Weed said eggs were often laid in wounds, and especially where ticks had been killed on the skin, so causing a clot of blood.

On motion, the Club adjourned till 1 p.m.

AFTERNOON MEETING.

The club met pursuant to adjournment at 1 p.m., President Osborn in the chair, twenty-two persons present.

Mr. Hudson spoke

ON ELECTRIC LIGHT COLLECTING AT PLATTSBURGH, N. Y.

The season at Plattsburgh often opens in February with *Homoglæa hircina* and *Xylina laticinerea*. Many rarities occur in March. Moths will fly at a temperature of 36° Fahr. The first Bombycid to appear is *Gluphisia lintneri*, early in April, *Smerinthus cerisyi*, *Phragmatobia assimilans*, *Ellida gelida*, *Audela acronyctoides*, *Feralia jocosa*, *F. major*, *Momaphana comstocki*, *Xylomiges dolosa* and many other extremely rare forms are to be obtained through such early collecting. The lamps give quarts of material which, though usually somewhat rubbed and torn, is of great value to the student for anatomical purposes, and, besides, furnishes material help in making out an important part of their life histories. Many orders are taken besides Lepidoptera. Many economic questions arise, such as the effects of this wholesale slaughter on the perfecting of fruits and seeds of plants depending to a great extent on night-flying insects for cross fertilization. Many insect allies, such as parasitic hymenoptera, aphis-eating insects, land and water scavengers, etc., are daily destroyed. What will be the effect of this new destructive force thrown on one side of a shifting balance already existing? Mr. Hudson showed types of two new Ptilodonts, *Gluphisia avimacula* and *Cerura modesta*, descriptions of which will soon appear. Much new material awaits any worker who will collect both early and late in the season. In nearly all genera of Lepidoptera, the males are much more frequently taken at the electric lights than the females.

Mr. Osborn agreed that even poor material was often most valuable for study purposes.

Mr. Smith commended the practice of early collecting. Experience has proved that some of the rarest forms in collections were scarce, only because they had disappeared when collecting began. He has this spring received from Mr. Dyar a lot of material collected at light in Manitou, Colorado, containing some supposed rare forms in great numbers, and some new species as well. The insects were nearly all poor, but valuable for study for all that.

Mr. Doran was rather interested in the idea of *early* collecting. In Tennessee he collected all the year round, and each season furnished something characteristic.

Mr. Fletcher asked whether the lights do not lose their attraction to insects after a time, and stated that such had been his experience at Ottawa where the insects had become largely accustomed to the light and were not nearly so much attracted as at first.

Mr. Hudson had found this so in Plattsburgh. Insects were very much less abundant now than when the lights were first started.

Mr. Schwarz had found that certain lights exercised a superior attraction year after year, and that they were now as good as they ever had been. He could never understand the reason why a certain light should be so attractive as compared with others immediately surrounding it, and apparently as favourably located. He did not think the fauna was much influenced by the specimens killed at lights. He was surprised to find, last June, that Salt Lake City, Utah, seemed to have no electric light fauna ; but this might be seasonal.

Mr. Smith thought it was certainly seasonal, for the late Mr. Henry Edwards had made quite an interesting collection of Lepidoptera at that point, almost all of them at the lights.

Mr. Smith, using the proof sheets of his new list as a text, made some

REMARKS ON THE CLASSIFICATION OF THE LEPIDOPTERA.

An order that is so general a favourite with collectors might be assumed to be well studied and well systematized. And yet that is exactly what the Lepidoptera are not. Characters for use are abundant, and excellent work has been done in certain groups ; yet save Herrick-Schæffer, no one has ever proposed a consistent classification of the entire order. In America such a work has been impossible from a lack of material, and the Herrick-Schæffer classification has proved too one-sided with the accumulation of new material. The order has also suffered from the large number of amateurs and superficial workers who describe an insect as belonging to a certain family or genus because it looks so, but who have not the remotest idea of the characters that really determine classification. The result when it is undertaken to arrange our species systematically, is startling, and the student soon learns that he cannot rely upon either generic or family references. There has been no system in the use of

group terms, and many so-called families are absolutely incapable of definition. A great many questions come up for settlement in the preparation of this list of Lepidoptera. Besides the editing, my work has been confined to the macro-heterocera as far as the Geometrina, and on the families there embraced a few remarks are made as explanatory of my views on the subject.

The *Sphingidæ* are well limited, and the classification is probably on a tolerably sound basis, yet there are two very distinct series that are probably independent branches from the original Bombycid stock. The *Smerinthinæ* now have their nearest allies in the *Ceratocampidæ*, while the *Sphinginæ* have their allies with the *Notodontidæ*. The *Sesiidæ*, which custom has placed immediately after the *Sphingidæ*, have nothing whatever to do with them. They are different in all stages, and save for a superficial resemblance in the imagines, there is no relation whatever. They should be associated with the *Cossidæ*, from which they are to-day very distinctly separated; yet, besides the larval habit, the imagos in many of the Sesiid genera have real Cossid affinities.

The *Thyridæ* are few in number, and the family is well marked.

Under the term *Zygænidæ* a most heterogenous mass has been usually classed. I long ago pointed out that none of our American species had the structural characters required by the definition of the family, and that the family, so well represented in Europe, is totally unknown in boreal America. I have, therefore, split up the series into compact groups, with family appellations.

The *Agristidæ* perhaps do not deserve to be called compact, and possibly part of the series may yet be transferred to the *Noctuidæ*.

The *Syntomidæ* are very well limited, but only feebly represented with us; nor have we many of the more typical forms, most of them resembling in appearance more nearly the *Pyromorphidæ*. The latter family is also small, well defined, and nearest to the next, the *Ctenuchidæ*, also a well limited group. The *Pericopidæ* form a natural lead into the *Arctiidæ* and *Lithosiidæ;* and, indeed, beginning with the *Syntomidæ* and running through the *Arctiidæ*, we have a fairly natural group. The *Pericopidæ*, are known to me only in the American species, and the family reference is by Mr. Hy. Edwards.

Three genera, which are probably related, are placed in the *Heterogynidæ*. This is also done on Mr. Edwards's authority, and I do not

believe that any of the genera belong to the family to which they are referred. I have not had specimens for study, and cannot say anything positively.

The *Nycteolidæ* are fairly well defined, and close relatives to the *Lithosiidæ* which follow them. This family as a whole is closely allied to the *Arctiidæ*, the presence of the ocelli only separating them.

The *Liparidæ* begin a new series of Bombyces, and the family is a fairly distinct one.

The *Limacodidæ* have been in considerable confusion; but Mr. Dyar's work promises to let in some light. In the larval state at least they were well distinguished.

The *Psychidæ* are also fairly well limited.

The *Dioptidæ* contain only a single species, referred to the family by Mr. Grote. The reference is at least questionable, and I assume no responsibility for it.

The *Notodontidæ* are quite well represented in our fauna, and are the most noctuiform of the Bombyces. The place given them in the series is a little open to question; but not more so than in several other cases. Generic references here are very unreliable.

The *Platypterygidæ* are tolerably well limited, and not numerous in species with us.

The *Saturniidæ* I have treated monographically, and they make a very well defined family.

The *Ceratocampidæ* have many points of similarity with the *Saturniidæ* and are as sharply defined. We strike here what I consider quite an ancient type.

The *Bombycidæ* have *Bombyx mori* as type, and possibly two sub-families are indicated in the series as associated.

The *Cossidæ* and *Hepialidæ* are both very well limited, while no more related to each other than to the Sesiidæ.

Under the term *Noctuina* I have united the *Thyatiridæ*, *Noctuidæ* and *Brephidæ*. The Noctuidæ are a very complete family, in which several quite distinct types seem combined. I have not been able to find any satisfactory line of division for sub-families, and the groupings proposed by Mr. Grote are too unequal in value and too entirely indefinable for adoption.

Mr. Mann thought the division into families a decided advantage, not only from the systematic standpoint, but also from the bibliographical point of view. It much facilitated reference making and indexing and the groups could in all respects be dealt with more satisfactorily.

The following paper was then read by its author :—

LONGEVITY AND VITALITY OF ARGAS AND TROMBIDIUM.

BY MARY E. MURTFELDT.

It seems incredible that creatures as highly organized as the ticks and mites should be able to live for months and even years without food, and, in the case of some of the former, are capable of surviving even a prolonged immersion in a somewhat acrid fluid.

As an illustration of this remarkable vitality I wish to call attention to the case of two species that have come under my observation during the past year.

About the middle of April last I received from a correspondent a specimen, probably about two-thirds grown, of a species of cattle tick, determined for me by Dr. Riley as *Argas reflexus*, and supposed by him to be found only, or usually, on pigeons.

This creature had been inclosed loosely in the folds of the letter of inquiry, and the pressure in the mail bags, or perhaps the postmaster's stamp had completely expressed its sanguinary contents which were smeared over the paper. The tick, however, though almost as flat as a sheet of paper, was very much alive, and, with the intention of making some experiments upon it, it was placed in a small bottle from which alcohol had been hastily rinsed, but which was not thoroughly dried.

Here it was suffered to remain for a week or ten days without further attention. At the end of this time, happening to think of it, I found it immersed in the moisture which had collected in the tightly closed bottle, which, by the combination of the water and alcohol, had become a fairly strong vinegar. To my surprise upon shaking the tick out upon a blotter I found it apparently none the worse for its acid bath. With a view to test its powers of endurance still further it was then placed in a small, tight tin box in which was a layer of dry sand and a bit of oak leaf.

Under these conditions it still survives. A fresh bit of vegetation is occasionally introduced into the box, but there is no evidence that the

Argas makes any use of these leaves; it neither increases nor diminishes in size, nor has it, as yet, moulted, although under such conditions the latter was to have been expected. Very similar to the above was the case of a specimen of the large and beautiful scarlet *Trombidium sericeum*—an egg parasite of *Caloptenus spretus*. A number of these mites were sent to me by a lady who had received them from Texas. They were put into a glass jar upon an admixture of sand and garden soil. Some young locusts were also placed in the jar as food, since I was not able to obtain egg pods of the latter. None of the mites, however, seemed to feed, and in the course of a month or six weeks all the smaller specimens had perished. One, however, that was considerably larger than the others, was found to have buried itself in the earth, and when turned out seemed to be perfectly healthy and not in the least shrunken. Upon being restored to the jar it at once burrowed into the earth, tunneling to the bottom.

In this way, hidden from sight, except as I turned it out about once a month, it survived, without food, until the following December, when, the temperature having fallen quite low in the room in which it was kept, it succubmed to cold and perished.

It was stated that Dr. Riley had kept a specimen of this tick alive without food for seven years, and that during that time it had repeatedly moulted.

Mr. Mann stated that he had kept a bombycid larva without food for ten weeks. It did not moult during that period.

Dr. Marx stated that *Argas* breeds also on cats and dogs as well as cattle, and is not confined to pigeons. He showed by blackboard sketches how, when some of the ticks are full fed, the family characters become obscured. Where the head is normally retracted under and concealed by the dorsal surface, when gorged with blood, this character disappears, and it is hard to distinguish them from the *Ixodidæ*.

Mr. Smith stated that he then had a *Trogoderma* larva alive in a vial closed with a rubber stopple, in which it had lived without food for more than a year. At irregular intervals it moults, but does not seem to change much otherwise, and does not eat the cast skins.

The following paper was read by the Secretary:—

NOTES ON TWO BORERS INJURIOUS TO THE MOUNTAIN ASH

BY D. S. KELLICOTT.

In the late publication of the Department of Agriculture on "Forest-tree Imsects" three species are mentioned as affecting the trunk of *Pyrus americana*, viz: The round and flat-headed apple-tree borers and an unknown longicorn larva. I have recently found two additional species fully as injurious as those mentioned. These are *Podosesia syringæ* and *Zeuzophora semifuneralis*. The former is a well-known Ægerian, usually destroying the lilac and white ash; it occurs in far too great abundance in both these plants at Columbus.

In April last the mountain ashes on the Campus of the State University were discovered to be suffering from insect attacks, and search soon disclosed scores of round openings leading into the wood, each guarded by a thin shell of the outer bark; these occurred from near the ground to the branches, and in a few cases among the branches. The knife easily uncovered a pupa in the boring, and the nature of the insect was at once foreseen. The distributions of the openings led me to think that here was a case in which an Ægerian larva had directly penetrated the uninjured bark, but by cutting away the wood sufficiently I soon found that they had entered originally at the borders of scars and irregularities caused by some other agencies; that in their long, larval imprisonment they had burrowed up and down the stem for sufficient distances to thus generally distribute the places of exit.

The first imago appeared April 28, and by May 10 all were out. In no case were they seen to emerge later than 12 m.; nearly all did so between 8 and 10 a. m. of sunny days. Oviposition was observed to take place in the afternoon as a rule, and the eggs were laid about the edges of wounds and deformities.

Prevention, therefore, is not difficult; sound trees practically have immunity; in case of injury some of the usual means of protection should be resorted to. The pupæ may also be destroyed with a wire or by other means. In a few instances ants were seen attacking and destroying them.

The second species mentioned is a Phycid and really does more injury than the Ægerian. In April and May numerous loose, white cocoons were found under bark loosened, evidently by the action of the larvæ preceding them. Early in May the moths appeared, escaping in

the afternoon. The first week in August larvæ were found mining under the bark, and evidently of this species; whether they are to mature and pupate this fall or defer this important change until spring remains to be seen.

The identification of the species was by comparison with examples in the National Museum. One of the specimens in that collection has a note written upon the label stating that it was taken from under the bark of the persimmon. I have also taken pupæ and cocoons from under the bark of the black cherry which appear to be identical. Imago not seen.

Mr. Smith then made some remarks

ON THE SPECIES OF CUCULLIA.

He had just completed a revision of the species with plenty of good material, and had found the species not difficult to separate. They are very closely related, and very constant, so that comparatively small characters are constant. A large amount of material from Colorado developed the interesting fact that there was a series of western species equal in number and parallel with an eastern series, and that as a whole each series differed more than the individual species did themselves. Thus far he does not know a single species found on both sides of the continent, while, besides this parallel series, each side has an oddity or two.

Mr. Schwarz said that parallel series of eastern and western species, such as described by Mr. Smith, were not rare in the Coleoptera, and asked whether in this scheme Texas was eastern or western.

Mr. Smith said neither series occurred in Texas, which had a species peculiar to itself and Arizona, and in answer to Mr. Ashmead, he said the nearest allies of the European species appeared in the western series.

Mr. Smith also made a few remarks on

STAINING INSECT TISSUES.

He had found considerable trouble in his studies in differentiating parts, and especially those structures that tend to become transparent. After considerable experimentation he had found *nigrosin* one of the most satisfactory stains for trachea and glands, and many of the membraneous structures. It does not touch chitine. By the use of this stain he had followed the trachea to the tips of antennæ and into the labella of flies. Saffronin is another valuable stain, and especially for chitinous structures, for which it seemed to have a special affinity. Combining

nigrosin and saffronin often gives very pretty results. Care should be exercised not to leave the objects in the saffronin too long, as it is apt to result in a uniform and too intense colour, which is hard to get rid of. Hæmatoxylin gave very poor results, and he does not look on it with favour. Eosin is excellent where only a slight stain is desired, and has given some beautiful results. The use of such methods in studies admitting of them will solve many problems that are still obscure.

Mr. Osborn commented on the importance of such methods and endorsed Mr. Smith's suggestion as to their desirability.

Mr. Fletcher then gave some

NOTES OF THE YEAR IN CANADA.

Apple pests had been more abundant than usual. Of these the Eye-spot bud-moth had been most often complained of, webbing up the flowers and young foliage and boring down the flowering spurs. At the same time the larvæ of *Teras minuta* and *Cacœcia rosaceana* occurred also in injurious numbers in many localities. Canker-worms had done considerable damage in some localities. Paris green had been successfully used for all the above. The canker-worm had attacked the Ash-leaved maples *(Acer Negundo)* in the streets of Winnipeg and at Brandon, Man. Cut-worms were not very abundant, but the larvæ of *Agrotis ochreogaster* or *A. turris* (both forms having been bred from the same larvæ), were destructive to almost all kinds of vegetation up to the middle of July. A feature of the year had been the enormous numbers of all kinds of plant bugs. Two of his most interesting observations were the breeding of a small weevil from oats which had been identified by Mr. Schwarz as *Macrops porcellus*. He had also bred it from the young stems of *Panicum Crus-galli*, and had succeeded in breeding one parasite. It bores in the stem just above the root. An account was also given of a serious outbreak of an imported saw-fly, *Fenusa melanopoda*, which for three years had entirely spoilt the appearance of the European alders upon the grounds of the Experimental Farm at Ottawa. The native species growing near these trees was not injured. There are two broods in the year, perfect flies appearing in June and July and September. Belated larvæ had been found in the leaves as late as Oct. 19th. The larvæ are leaf-miners, and there are sometimes 15 or 20 mines in a leaf. The mines are at first separate, but after a time run together, and the larvæ all live together, frequently consuming nearly the whole of the parenchyma of

the leaves. The perfect insect is a small black saw-fly about ⅛ inch in length.

Nematus Erichsonii, the imported larch saw-fly, was stated to have done enormous damage in Canada. Thousands of acres of American larch having been killed by the attacks of the larvæ.

Mr. Ashmead in comment stated that *Fenusa* is also found on the alder in Europe, and that he has no doubt it is the same species bred by Mr. Fletcher.

The Club then adjourned till 9 a. m. of the 22nd.

AUGUST 22, 1891.

The Club met at 9 a. m., President Osborn in the chair, 19 members present.

The minutes of the morning meeting of the 21st were read and approved. On motion of Mr. Mann the Secretary was authorized to make up the minutes of the afternoon meeting, and to publish the same after submitting to the speakers the report of their remarks, if deemed necessary.

The following communication from Mr. Wm. H. Seaman, 1424, 11th Street, N. W., Washington, D. C., was read by the Secretary :—

" Having engaged in an investigation of the structure of the Photogenic organ of our common fire-fly, *Photuris pyralis*, which will be published in the proceedings of the American Microscopical Society in about two months, I would solicit information as to the habits of these insects not now in print, and especially on the following points :—

' Fire-flies are very numerous on the Lower Mississippi. What is the most common species there ?

' What is the most numerous species on the Pacific Coast ?

' Are the eggs luminous ?

' Do the insects lighten on returning to the ground as much as on rising ?

' Do the sexes, where both are winged, seek each other on the tops of trees or exclusively on the ground ?' "

Mr. Claypole spoke on

A METHOD OF PRESERVING LARVÆ FOR CLASS USE.

He spoke of the constant care necessary to prevent evaporation of

alcohol, and the trouble with corks in general, and advocated sealing in a glass tube half filled with alcohol, or the alcohol could be entirely omitted after the insect had been killed in it, and the specimen would be free and easily studied. Specimens illustrating the method were exhibited. He seals his tubes with a blow pipe, making a sharp flame, and in this way a vial even three-quarters full of alcohol could be closed readily.

He also spoke of

A CHEAP SUBSTITUTE FOR CORK.

Cork for lining insect boxes is expensive, and he has found that soft pine, cut across the grain, formed a good and cheap substitute

Mr. Osborn said Dr. Packard had also advised sealing vials containing larvæ. Where no alcohol was added it was of course necessary that the specimens be perfectly hardened. The wood to be substituted for cork must be very soft and even.

Mr. Smith said it would be very difficult to get material so free from resin that a paper covering would not be stained.

Mr. Mann said strawboard and a frame covered with paper had been suggested as substitutes for cork.

Mr. Webster said corrugated paper was very convenient for some purposes.

Mr. Claypole said all forms of strawboard or paper failed for want of elasticity in the material. Cork and wood are elastic and clasp the material firmly.

Mr. Smith said this was the objection to turf, which was otherwise a very satisfactory material.

Mr. Mann uses no lining of any kind in his boxes. He thought the pita-wood, formerly imported by him about as good as anything, and thought it could be brought in quite cheaply.

Mr. Smith said that even pita had its hard streaks, and that while generally excellent, it was not sufficiently uniform. On a small scale, for study boxes, corn pith was not bad.

Mr. Fletcher said the lower part of the stems of *Typha latifolia* is still better; but the compressed cork now on the market is sufficiently cheap, and is excellent.

Mr. Ashmead said that in the Berlin Museum they often preserved different stages of an insect in small tubes inclosed within a larger tube.

Mr. Fletcher spoke of his experience with the acetic acid mixture, recommended by Mr. Smith at Champaign last year. He found the mixture of equal parts, alcohol and acetic acid, not the best proportion, and had added 25 per cent. distilled water with good results. He exhibited a number of specimens in this liquid, perfect in colour and shape. For white larvæ he finds it especially good, preserving form and colour perfectly. In response to a question by Mr. Doran, he said the mixture was cheaper than alcohol alone.

Mr. Marlatt asked whether the mixture was not corrosive to the skin where it was freely used.

Mr. Smith replied that where the mixture contained less than 50 per cent. of acid it was harmless. Where the skin was broken it caused an itching or burning; but clear water readily cured that.

In answer to a question by Mr. Mann, he stated that the evaporation was not so great as with alcohol alone; but that there was a tendency to attack cork stopples. It does not touch rubber. The advantage in the acid was its effect in preserving form, preventing the shrivelling effect of the alcohol. The insects were just as good for study and the internal organs preserved as well as in alcohol. In reply to a question by Miss Claypole, he said that for spiders it was excellent.

Mr. Fletcher asked whether anyone had used Carbolic Acid as a preservative. He had been asked to collect butterfly eggs and to preserve them in strong carbolic acid.

Mr. Mann has used a very weak solution satisfactorily, and has found that there is very little or no evaporation of the liquid.

Mr. Howard asked whether the acid had any staining effect, and Mr. Osborn whether it did not shrivel material.

Mr. Smith had never noticed any staining effect. He uses the acid to clear specimens previous to mounting in balsam, and some material gets no other treatment save a soaking in the acid. He finds that it renders tissue transparent, and that a katydid placed in the strong acid became uniformly glassy so that it could be almost seen through. It stained no part of the internal structures. Removed from the acid and placed in alcohol the insect gradually became opaque as before. It does not seem to shrivel and does not destroy very rapidly as far as his experience goes.

Mr. Claypole said it had a bleaching effect.

Mr. Riley exhibited specimens of *Megaphycis bollii* in all stages, and made some brief remarks on the life habits of the species, which he was led to do by the fact that Mr. Smith had recently bred it from prickly pear in New Jersey. His own specimens had been bred from the fruit of Opuntia in Florida, first received in 1877 from Mrs. Mary Treat, of Green Cove Springs, Fla., and subsequently from Mr. H. G. Hubbard, Crescent City, Fla., in January, 1883. He had had the species marked with the MSS. name *Myelois opuntiella*, and had had engravings made of all stages for many years; but as he had learned in 1882 that the insect had been described as *Metitera prodenialis* by Walker, he had never published his description, and the species was subsequently named as *Megaphycis bollii* by Zeller. According to the law of priority this last name, both generic and specific, would have to give way to Walker's. The breeding of this species in New Jersey gave it a more northern range than had been hitherto recorded.

As a supplement to the paper which was expected from Mr. Lintner, he further exhibited a box containing specimens of ♂ and ♀ *Phengodes laticollis* and *Zarhipis riversii*, and called especial attention to the larviform females.

He also called attention to the fact that in connection with Mr. Pergande, he had been of late making special collections and observations of *Phylloxeræ* at the request of Mr. Dreyfuss, who was preparing an elaborate work on them. He had found many interesting new forms and many facts that were new concerning the habits of the gall-makers on hickory. He had also found an interesting species on willow and *Nyssa*, and stated that the hickory species are much more numerous than had been supposed.

He also exhibited a box of specimens, with drawings, illustrating the life habits of *Sphecius speciosus*, which had not been previously recorded. The egg and several larval stages were shown in the specimens. One of the most interesting features is in the cocoon. There is a median band lined with silk, containing curious circular perforations which have the appearance of minute tubes reaching the exterior of the walls of the cocoon with a sort of rim, recalling in appearance stigmata. He was obliged to leave without going into further details, but hoped for an expression of opinion from others as to the object of these peculiar perforations.

Mr. Marlatt, who had assisted Mr. Riley in his work on this insect, described more particularly the structure of these perforations, illustrating by blackboard sketches. They are really distinct tubes of a gutta-percha-like appearance and consistency and differing entirely in texture from the remainder of the structure. Inwardly they were closed by a layer of silk so that they really did not perforate the entire cocoon.

In response to a question from Mr. Wallace he stated that he did not think any commercial use could be made of the cocoon.

Mr. Schwarz commented on the present state of our knowledge in the *Phengodini*. We do not know what is a species in *Phengodes*, and probably too many names exist. Of *Zarhipis* we have four named species, which must be reduced to two, *integripennis* and *ruficollis*, the latter including *riversii* and *piciventris* as colour varieties. Of several eastern species of *Phengodes* it is difficult to get specimens of the male, and we do not even know the male of the species occurring in Maryland and the District of Columbia. Prof. Riley has the only collection containing the larviform females of several eastern species of *Phengodes*; but only one of these, *laticollis*, has been connected with the males.

Mr. Mann asked whether not more than one species existed in Massachusetts. He has described in Psyche three forms of larvæ or females that he collected in that State.

Mr. Schwarz replied that he had never seen a male *Phengodes* from Massachusetts; but there was probably only a single species. The three different forms of luminous larvæ described by Mr. Mann may be satisfactorily accounted for by supposing one to be the larviform female imago, the second the larviform pupa of the female, and the third the larva of the male.

On motion the Club adjourned to meet again under the rules at the next meeting of the A. A. A. S.

J. B. SMITH, Acting Secretary.

ANNUAL MEETING.

The annual meeting will be held in London at the Society's rooms, Victoria Hall, on Wednesday, 25th Nov. All are invited to attend and contribute papers.

Mailed October 31st.